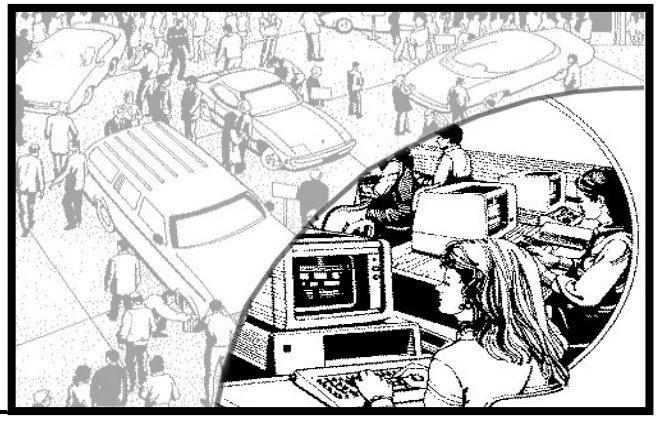
Chapter 2
Risks and Hazards Analysis



CHAPTER 2: RISKS AND HAZARDS ANALYSIS

INTRODUCTION

While planning an event, it is important to consider every possible risk and hazard that may occur. This chapter covers most of the basic risks found at an event. The responsibilities for these risks vary with each jurisdiction, and every community needs to have a plan listing who or what organization will respond to the anticipated risks or hazards. Knowing the risks ahead of time and planning for those risks are essential to successful planning. Planning for the worst may help reduce the chance of "worst-case scenario" happening. If the responding agency knows the risks ahead of time and is alert, it can reduce its response time, ensuring the safety and security of those in attendance. Risks vary depending upon the type of event; therefore, event organizers must tailor planning for each risk to the specific event.

The promoter is one source of information on potential risks faced at the event. The promoter should be aware of the support services needed to respond to any incident and the availability of those services in the community. If event organizers know the possible risks an event poses and the nature of the audience likely to attend the event, they can analyze the hazards and take necessary steps in planning a safe event.

HAZARD ANALYSIS

Hazard analysis provides planners with information about the kind of emergencies that may occur and potential consequences. Analysis assists planners in deciding what steps to take to prevent the possible hazard and how to respond if an incident occurs.

The best way to begin a hazard analysis is to list the possible risks present at the event. Every community's list will differ based on topographical and geographical features, weather patterns, and other factors. (Tsunami, for example, would not be identified as a hazard in an area that is far from a coastline.) Identifying hazards also includes considering the possibility of a secondary hazard (for example, a tornado may lead to power failure, loss of water, and other hazards).

The following table includes some of the more obvious risks and possible hazards that may occur. Being prepared for the worst allows planners to have responders and supplies on hand if a hazard does occur.

Typical List of Risks and Hazards	
Abandoned vehicles	Hazardous material release
Airplane crash	Hurricane
Airspace encroachment	Kidnapping
Assault on county official	Landslide
Assault on federal official	Loss of utilities (water, sewer, telephone)
Assault on state official	Lost child
Avalanche	Lost and found
Bomb threat	Media relations
Bomb found	Motorcades
Building inspection	Mudslides
Cancellation of event	Parking
Civil disturbance with demonstrations	Permitting
Communications	Power failure (sustained)
Credentials	Radiological release
Crowd control	Security
Dam failure	Structural collapse
Demonstrations	Subsidence
Dignitary protection	Terrorism
Drought	Ticketing
Earthquake	Tornado
Epidemic or other public health concern	Traffic control
Evacuation of area	Train derailment
Fire	Tsunami
First aid matters	Urban conflagration
Flood	Volcanic eruption
Food handling violations	Weapons of Mass Destruction
Food waste disposal problems	Wildfire
HazMat	Winter storm
Hostage without terrorism	
Human waste disposal problems	

Risks and Hazards Analysis

Event planners must identify characteristics of each possible hazard to determine the risk and consequences. Characteristics to identify are:

- Frequency of occurrence—the frequency of occurrence (both historical and predicted) for each hazard in the particular jurisdiction;
- Magnitude and intensity—the projected severity of the hazard's occurrence;
- Location—the location of the hazard, if the hazard is associated with a facility or landscape feature;
- Spatial extent—the geographic area expected to suffer the impact of the hazard (either around the known location of a hazard or as an estimate for non-localized hazards such as tornadoes);
- Duration—the length of time the hazard may be expected to last;
- Seasonal pattern—times of the year when the hazard threat exists (based on month-by-month historical occurrence); and
- Speed of onset and availability of warning—the amount of time projected between first warning (if any) and actual occurrence.

Potential Consequences

To determine potential consequences of a hazard, estimate the lives, property, and services at risk. Evaluate the extent of the hazard by closely examining your community in terms of:

- People (deaths, injuries, and displacement),
- Critical facilities (days of service loss, repair time),
- Community functions (disruption),
- Property (damage, destruction, cost of replacement or repair), and
- Potential secondary hazards (dams, chemical processing plants).

When evaluating hazards, remember that hazards may occur in multiples and that one hazard may cause a secondary hazard.

Steps in Hazard Analysis

1. Identify the Hazards
   Determine what kinds of emergencies have occurred or could occur in the jurisdiction.

2. Profile Hazards and Their Potential Consequences
   Compile historical and predictive information on each of the hazards and overlay this information on community data to estimate the hazard's potential impact on the community.

3. Weigh and Compare the Risks
   Determine the relative threat posed by the identified hazards, using qualitative and quantitative ratings. This information enables the planners to decide which hazards merit special attention in planning and other emergency management efforts.

4. Create and Apply Scenarios
   For the top-ranked hazards (or those that rate above a certain threshold), develop scenarios that raise the hazard's development to the level of an emergency. This is a brainstorming activity that tracks the hazard from initial warning (if any) to its impact on a specific part of the jurisdiction and its generation of specific consequences. Brainstorming provides information about what actions and resources might be required for response.

After you identify hazards and assess risks, you should order the risks by priority and develop strategies to deal with each hazard.

CONTINGENCY PLANS

Unfortunately, not every event runs smoothly. Often, incidents occur that are beyond the control of the planning team. Therefore, contingency plans for every event should be in place.

An emergency response plan requires a comprehensive hazard and vulnerability analysis. Consultation among all parties who may respond to an emergency situation during the event is essential.

Some important questions related to Incident Command System planning include:

- What weather conditions may require cancellation of the event?
- What weather conditions will postpone the event?
- How will storm warnings be monitored?
- What plans are in place for sudden, severe weather conditions, such as tornadoes? Will shelters be available?
- Who has the authority to make these decisions, and at what point do they exercise that authority?
- How is notification made of a cancellation or postponement?
- Are additional security personnel, including police, on standby or on call should an immediate increase in these services be required?
- Have you advised ambulance services and local hospitals of the nature of the event, provided an expected spectator profile, and estimated potential medical problems?
- Have you notified fire and rescue services of the nature of the event and identified the services that might be required?
- Have you identified the types of heavy equipment that could be required in a catastrophe (for example, a grandstand collapse)? Have you made plans to obtain that equipment at any time, including off-business hours?
- Have you advised counseling services of the nature of the event and identified the services that might be required?

- If the event is particularly dangerous, and deaths are a real possibility (for example, at automobile or power boat races or air shows), have you formulated plans to support any required coroner's investigation?
- In order to permit responders to precisely identify the location of an emergency quickly, address the following questions:

  - Will a grid-type venue plan be available, which is common to all emergency services, including access roads, pathways, major landmarks, spectator, performer and vendor areas?
  - Will vendor locations or booths be numbered and be included on the venue plan?

STRUCTURAL MATTERS

An area of great concern is the physical set up of the event. Planners need to consider what performance facilities are needed, what special structures are needed for indoor or outdoor events, and whether temporary structures can be used. These are just a few primary concerns.

Stages, Platforms, and other Performance Facilities

When setting up an event, stages, platforms, and the other performance facilities are an area of major safety consideration. The type of event and its site affect the choice of performance equipment and its stability requirements. Qualified inspectors should perform some type of inspection to ensure the structure is appropriate for the event and that the structure is safe.

The expected behavior of the crowd is one of the principal factors determining stage configuration. While classical music and ballet performances usually attract a mature and orderly audience, teenage and pre-teen fans at rock concerts have been known to storm the stage in order to touch their idols. Such incidents, apart from being disruptive, have caused injuries. Therefore, event planners should understand the emotional and physical character of the audience that a particular performance will attract.

There are three principal ways to gather information about the anticipated crowd:

- Review press reports and contact local public safety officials who were present at previous performances;
- Speak with spectators who have attended adolescent entertainment events such as rock concerts (in the past, spectators have provided valuable insights into what behavior authorities might expect from audiences for different entertainers); and
- Check with the promoter to determine audience behavior at past events and the type of crowd and their behavior that can be expected.

Stages are usually elevated to provide the audience a better view of the performance, especially for spectators who are farther back. This elevation is itself a barrier to those who would rush the stage in an attempt to touch a performer. In addition, this increased height can

create an area free of spectators at the base of the stage because the audience will position themselves back from the stage so that their line of sight is not impeded.

At some venues first aid personnel are located under the stage to accept injuries occasioned at the front of the spectator area. However, a stage or a platform alone is usually insufficient to deter determined and agile spectators, and an additional physical barrier is needed in front of the stage.

Indoor Events

During concerts held indoors, an effective practice is to erect a "V" shaped barrier in front of the stage to deflect patrons away from the stage area should any surge come from behind. The "V" shape also provides an additional barrier to prevent spectators from reaching the stage. Security staff can position themselves in this spectator-free zone or should be able to gain access to it quickly from either end of the stage.

Barrier posts must be securely anchored to the floor, not merely mounted to freestanding bases. They should also have some padded protection. Such a fence construction is usually engineered to provide a certain amount of "give" upon impact, thus reducing the potential for crush injuries as occasioned in the 2000 Denmark, Pearl Jam concert tragedy.

Outdoor Events

Board fences similar to the "V" shaped barrier described for indoor concerts can be used in an outdoor setting. Board fences have the added benefit of providing a walk space on the spectator side of the fence as well as behind it. Because most outdoor concerts do not provide seating, spectators in the front rows seated on the ground have to take a position several yards back from the fence to permit them to see the stage over the top of the fence. This area permits emergency access to the front rows of spectators.

Any stage protection barrier must be designed to sustain a certain amount of flex in order to prevent the crushing of spectators in the front by a crowd surge from behind. At the same time, it must be sufficiently solid so that it will not collapse and cause injuries. Fences installed as stage barriers often fail to meet this two-fold requirement.

Break-Away Stage Skirts

The front skirt around the base of a stage can be constructed to break away under the pressure of a crowd surge, thus allowing spectators to be pushed under the stage rather than be crushed against its base. However, this idea is not practical where there is less than six feet clearance beneath the stage because of the potential for head injuries should a spectator collide with the leading edge of the stage.

It should be stressed that use of a breakaway stage skirt does not remove the requirement for a barrier in front of the stage and should be considered only as additional security if barriers fail.

Temporary Structures

Due to their transitory nature, many events require easily constructed temporary structures. These include the stage platform itself, as well as towers to house speakers and floodlights, temporary seating such as bleachers, dance platforms, roofs, towers and masts, viewing platforms, marquees and large tents, and decorative items such as archways, overhead signs, and even sideshows.

All such temporary structures must be designed and erected to include a margin for safety and a view to potential hazards. A local government building-codes inspector should supervise the erection of temporary structures and ensure that they conform to local government building or engineering specifications.

Temporary structures are often hurriedly erected since access to the venue may be permitted only a short time before the event opens and they are usually designed for rapid removal at the conclusion of the event. In addition, these temporary structures are frequently neither designed nor erected to withstand stresses other than from intended use and are therefore not engineered to incorporate safety features. High winds or spectators climbing for a better vantagepoint can overstress these structures. A number of accidents have occurred in the past when such poorly designed or constructed structures are stressed in these ways.

Personnel should inspect temporary structures periodically during events of long duration. They should post warnings on or close temporary structure whose intended purpose is being violated.

Load Capacity

All structures have load capacities, and precautions should be in place to prevent misuse through overloading. Any viewing platform or vantagepoint, such as a building verandah or balcony, can cause a major incident if the number of spectators upon these structures is not properly controlled.

The bases of temporary structures must be protected from damage by vehicular traffic through the use of designated buffer zones.

Seating

Ideally, all seating should be reserved; however, this desire may be difficult to achieve at outdoor events.

If most of the spectators are 16 years old or younger, provide seating to control surges and crushing at the front of the stage. A security presence to ensure that audience members do not stand on seats is also recommended. Seating should be adequately anchored to prevent its movement.

Another area of concern is the spacing of the seats. The seating should be spaced far enough apart to allow emergency crews access to patients. Often grouping the seats and providing large walkways between the groups is a way to do this.

Temporary Seating and Anchorage

Seating in a community center, arena, or similar indoor location often combines fixed perimeter seating with additional foldable or stackable seating on the central floor.

Temporary seats are often not secured to the floor or to one another. While this may not present any problems with ordinary audiences, more enthusiastic spectators may pose the following problems:

- Persons standing on the seats for a better view are prone to injury because they may lose their balance or are jostled. In such instances, they can adversely affect other spectators, sometimes causing a "domino effect" in closely spaced chairs. The potential for a significant number of injuries exists; and
- If an audience becomes hostile, portable chairs can be used as dangerous missiles. It is not uncommon for hostile fans to become aggressive and throw items. Seats not anchored become dangerous projectiles.

Portable, folding, or stacking chairs should be secured to the floor. Where this is not possible, attach the legs of each row of chairs to two long planks, one running under the front pairs of legs and one running under the back, as an alternative solution.

SPECTATOR MANAGEMENT AND CROWD CONTROL

We have shown the hazards associated with structural design and integrity, but what about the dangers created by the participants themselves? The aim of spectator management and crowd control is to maintain order, prevent deviation from desired behavior, and re-establish order should it break down, thereby ensuring maximum enjoyment for the assembled gathering. Event organizers are responsible for spectator management and crowd control; however, this function passes to local authorities, such as police, fire, and emergency medical services, when the situation is beyond the resources and capability of the organizers. Knowing what to expect can lessen risks and hazards from the crowd itself. Event organizers must have an intelligence plan in place before the event happens.

Spectator management refers to planning and preparation issues, such as ticket sales and collection, ushering, seating, parking, public announcements, toilets, and washrooms.

Crowd control refers to mechanisms used to re-instate order, such as limited access control, admission control, and arrests.

A crowd is defined as any number of people coming together in any place for any reason. Crowds gather daily in shopping centers, airport, and stadiums and occasionally in places not designed specifically for large numbers of people.

In the planning process for a forthcoming event, organizers must have an understanding of both individual and crowd dynamics and how these elements interrelate. We offer an incomplete guide to crowd control problems that organizers most frequently encounter. The issues need expansion for each crowd and venue. You may find additional information on crowd control in other literature and press reports; from the promoter; private security organizations; police, fire, and emergency medical authorities; and, for visiting dignitaries, from personal security services and government agencies. All this information will assist in predicting potential problems that you can then address in the planning process.

General Issues for Consideration

Major crowd issues you should address include:

- Size - Maximum numbers permitted are often established by regulation for safety reasons;
- Demographics - Consider the composition of the audience, including age and gender mix. If you identify in advance that young children will constitute a high proportion of the audience, consider additional facilities, such as childcare, family bathrooms, and rental strollers. Audiences made up of young children or elderly people tend to require additional medical facilities, and children and the elderly are more susceptible to crush injury than teens or adults.

  Different kinds of events may attract certain types of spectators that require special attention. Consider the following:

  - Rock concerts may experience a higher incidence of problems with drug and alcohol abuse, underage drinking, and possession of weapons than other concerts.
  - Religious and “faith healing” events may attract a significant number of ill and infirm people, which may increase the need for onsite medical care.
  - Events for senior citizens may also require higher levels of health services.
  - Certain sports events may attract over-reactive and violent supporters.
  - Cultural events may require special arrangements, including the provision of interpreter services, special food services, and multilingual signposting, brochures, and announcements.

- Types - See Crowd Types in the appendix page 5;
- Catalysts - See Crowd Catalysts in the appendix page 7;
- Behavior - See Notes on human Behavior in the appendix page 1
- Densities - See Critical Crowd Densities in the appendix page 8;
- Metering - Control procedures used to prevent critical crowd densities from developing in specific areas, especially useful in managing potential "bottlenecks;"

- Throughput Capacities - See Crowd Throughput Capacities in the appendix;
- Outdoor Concerts - additional considerations:

  - Control and distribution of spectators in the field,
  - Suggested minimum space allocation of 4 - 5 square feet per person on grounds with no seats, and
  - Some form of sectoring and barrier management by security is important.

Entrances and Exits

Important considerations for the entry and exit of spectators include:

Entrances

The primary function of entrances is to provide:

- For supervision, marshaling and directing crowds,
- Access for emergency services, and
- Egress and evacuation routes.

Entrances should also:

- Be clearly signposted,
- Be in working order,
- Provide access for wheelchairs, and
- Provide separation of pedestrian and vehicular traffic.

Entrance Management— Event organizers should:

- Permit flexible opening and closing times. (However, advertised times are recommended.);
- Stagger entry times by providing supporting activities;
- Keep entrances clear of all other activities;
- Keep lines away from entrances;
- Ensure there are sufficient numbers of suitable barriers, fences, gates and turnstiles;
- Locate ticket sales and pick-up points in line with, but separate from entrances;
- Arrange to have a public address system or alternative communications system to provide information and entertainment to the crowd waiting at the entrance;
- Provide sufficient numbers of personnel who are appropriately trained;
- Ensure that control points for searches to detect prohibited items, such as alcohol, social drugs, glass, metal containers and weapons, are in place and do not affect movement;
- Provide a secure area for the storage of confiscated goods;
- Provide toilets, if lines are expected to be long; and
- Apply metering techniques as appropriate.

Exit Management —Event organizers should:

- Ensure that exit doors are not locked. If personnel are concerned about illegal entry, then doors could be fitted with alarms.
- Ensure exit doors open in the direction of escape and are confirmed as operational;
- Check placement, function, and signposting of exits;
- Ensure that doors that do not lead to an exit are so marked, preventing "dead end" entrapment and the potential for panic;
- Ensure that all exit corridors are free of all impediments to crowd movement;
- Ensure that turnstiles are freewheeling or can operate in reverse; and
- Ensure that cables, which can create trip hazards, do not cross exit corridors. (If this precaution is unavoidable, the cord should be marked, insulated, and secured to the floor to prevent damage and potential electrical risks.)

Escalator Management — Event organizers should provide for:

- Staff control at top and bottom, including an emergency stop button, and
- Metering of flow at both ends.

Stairway/Corridor Management — Event organizers should provide for:

- Control of both ends if the crowd is large, and
- Metering that may be required for safety.

Ticketing

Ticketing is the first means of achieving crowd control. Essential matters to address include the following:

- If advanced ticketing is possible, it is preferred since it allows organizers to anticipate audience numbers and plan accordingly. It also enables them to pass on information about needed services (for example, parking, traffic patterns, first aid, water sources, toilets, and personal needs) to ticket-holders before the event.
- When multiple entrances to the venue are provided, directing spectators to arrive via specific entrances can reduce congestion.
- If it is feasible, stagger crowd arrival by specifying entry times. Again, this plan reduces congestion at entrances.

Barriers

Effective use of barriers can prevent many problems, including congestion in thoroughfares and walkways. Questions you should consider in the planning phase include the following:

- What types of barriers are required? Is a solid physical barrier required, or would a psychological barrier, such as barrier tape, suffice? The use of psychological barriers is

suitable only for orderly crowds. Any physical barrier must be able to withstand crowd surges.
- How will personnel respond if the barrier is breached?
- Can barriers be used to section the crowd and create passages for emergency personnel to evacuate ill or injured spectators?
- Will barriers be used to create a "pit" between the crowd and the stage, which can be used to facilitate the evacuation of injured spectators?
- Can barriers be easily dismantled by crowd and used for other purposes?

Defusing Crowd Tension

The tedium that is created by an extended wait in line for tickets or admission can be a precursor for crowd control problems. Such boredom can create or magnify tempers, particularly if, with little distraction, those in line perceive other doors being opened first or other patrons getting in at the head of the line.

The following means of defusing anger have been used with success in different venues:

- Up-tempo music (of a type consistent with the age group of the crowd) played over the public address system;
- Humorous, animal-costumed individual, such as a mascot, walking up and down the line giving handshakes, pats, and waves;
- Large inflated beach ball, which is lobbed back and forth over, and by, the spectators;
- Food and beverage sellers moving through the group; or
- Cheerful security staff, passing up and down the line, talking to people.

Introducing some of these same distractions inside the event can calm a potentially agitated crowd.

In addition, a mascot conducting a spectator sing-along to up-tempo music or a ticket or program number draw on the field for the last ball used at a sporting event can alleviate tension in a crowd.

Whenever possible, spectators should be informed before an event of any special conditions or arrangements for the event, such as parking, clothing, food and drink, sunscreen, shelter, and alcohol restrictions. Notice of special conditions or arrangements may be distributed through advertisements or in leaflets accompanying tickets.

Outdoor events, sometimes spread over large areas, require further considerations, such as:

- Toilet facilities located outside gates and between disembarkation points and the venue,
- Shelter, and
- Telephone facilities.

The venue should allow adequate regulation of crowd movement, such as adequate exiting from ticketed seating areas and sectoring and flow barriers, including barriers to separate vehicles from pedestrians.

Spectator overflow areas should be available to prevent crushing. Contingency plans are required in case spectator turnout significantly exceeds expectations. This phenomenon is common at rock concerts.

Restricted Viewing Locations

Clear lines of vision for spectators are important to reduce the likelihood that crowds will move to get a better view of the stage. Also, a wide angle of view helps to reduce crowd densities in front of the stage.

Video Screens

Video or projection screens aid in management since they can provide:

- Entertainment before and between acts,
- Information concerning facilities and important messages including public safety and traffic messages for both inside and outside the venue, and
- Close-up vision of on-stage action for spectators as a means of reducing crowd movement toward the stage.

Panics and Crazes

While the word "panic" is associated with a number of human behavioral patterns, in a crowd application, perhaps the definition by Fruin (5) is most appropriate. He defines panic as:

> ". . . group behavior involving flight from a real or perceived threat, in which personal escape appears to be the only effective response. . ."

As Fruin emphasizes:

> "[I]nitial flight from a real source of danger is a very normal human reaction. . . . [P]anic behavior is really a result of frustration of that escape."

While panic is normally a flight or escape reaction, a craze is an opposite, but equally threatening, crowd reaction.

Fruin defines a craze as:

> ". . . group behavior in which there is a temporary, short-lived competitive rush by a group toward some attraction or objective . . . ."

An alternate, but parallel definition is that a craze reaction exists:

> ". . . where no apparent danger is perceived [by numbers of a group] but [where] the group is given direction . . . by an induced sense of urgency . . . ."

Group restraint is temporarily abandoned as a result of a short-term fixation on the objective.

Panics are usually associated with crowd egress (exiting), whereas crazes are associated with crowd ingress (entering).

Often, absences of information, incorrect information, or perceptions are catalysts for the panic or craze. Remember that, in a dense crowd, individual perception is limited to interpretation of response behavior among surrounding persons in an individual's immediate view.

TRAFFIC AND TRANSPORTATION

Transportation presents one of the first impressions attendees will have about an event's organization, command, and control. Sitting in a line of cars for hours on the highway to gain access to an event will undoubtedly create a negative impression. The traffic from the event may not merely effect the local traffic but the traffic in the entire region. Planners should ensure the surrounding communities are aware of the event and the potential impact on traffic in their area.

Depending on the scope and size of the event, traffic may be a routine issue. For example, many sports stadiums hire professional traffic planners to provide guidance on the most efficient ways to facilitate access and egress to various parking lots, and have procedures in place that adequately handle traffic flow on a regular basis.

The promoter is responsible for any traffic disruption that is associated with the event and should be held accountable by the permitting authority. The permitting authority can require the promoter to work with local public safety and traffic service providers to create contingency plans to minimize negative traffic impacts on the community at large.

As a minimum, local law enforcement, departments of transportation and public works, the local media, any existing public transportation authorities, and the promoter should comprise a traffic management group who must begin traffic planning well in advance of the event. Well in advance of the event, the group should use the local media to inform residents of the expected impact the event will have on their mobility.

Being straightforward about anticipated problems or congestion areas with the local community will minimize the negative impact on local traffic service agencies. Many residents, when advised in advance to do so, will avoid certain areas or take alternate routes so their movement is not impeded or prolonged.

Traffic and transportation concerns that traffic management must address include:

- Does the site have adequate access and staging area for large numbers of emergency vehicles in the event of a major incident?
- What impact will weather conditions have on transportation?
- What type of road leads to the event? Paved? Gravel? Dirt?
- Is access to, and the road network within the site, adequate to prevent emergency responders from having to walk significant distances to the principal spectator areas(s)?
- Once on the site, is there sufficient room (that is, for staging, maneuvering) to permit repositioning or redeployment of emergency vehicles as dictated by the incident?
- Due to the nature of road access, would early arriving vehicles, such as ambulances, be prevented from leaving by gridlock produced by subsequently arriving equipment?
- Does an access road or street that could be closed to the public and used only for expeditious emergency and service vehicle ingress and egress serve the site?
- If access roads are unpaved, would emergency vehicles become bogged down if heavy rains occurred during, or just prior to, the event?
- Is the surrounding road network able to handle the anticipated spectator vehicular traffic?
- If spectator-parking areas are filled, will the road network allow continued vehicle flow, thus preventing gridlock?
- Is signposting, including gate numbering, clearly established inside and outside the venue?
- Are communications systems inside and outside the venue capable of providing public announcements, marshaling instructions, and evacuation orders?
- Is a system in place to monitor crowd flow (as through the use of spotters or aviator resources)?
- Does the organization have additional towing vehicles available?

Where there may be health and safety implications, efficient management of crowd movement includes:

- Awareness of public transport congestion at road, rail, and water interchanges and, in some cases, at airports;
- Use of coaches and buses to reduce private vehicle traffic and any potential problems which large vehicles may present, for example access difficulties, parking requirements, potential road blockages;
- Alterations to normal traffic and road use;
- Traffic control;
- Adequacy of the surrounding road network to handle the anticipated spectator vehicular traffic before, during, and after the event;
- Communication between traffic management groups and other services, including the local media; and
- Access and egress routes including:

    – Arrangements for people with disabilities;

- Pedestrian access, including considerations of distance, terrain, surface, and lighting; and
- Designated pick-up and set-down points.

Vehicle Access and Egress Routes

Consider the environmental hazards that may result if access and egress routes are not established for:

- Portable toilet pump-out;
- Garbage removal;
- Water tankers;
- Car parking;
- Ambulances;
- Law Enforcement vehicles;
- Fire vehicles;
- EMS vehicles;
- Public Works and Utility vehicles; and
- Other essential service vehicles.

Signage and Use of the Media

If organizers anticipate that event traffic will have a major impact on community surface streets, they should consider ordering the promoter to hire a professional traffic planner to work in conjunction with law enforcement and public works to create alternate routing or special signage to and from the event. Strategically placed, variable-message signs on the highway that allow text messages to be changed by remote control are very useful devices to inform the motoring public. Temporary, fixed signage can also be considered. The additional signs must be the current industry standard and be easily understood by the public.

Additionally, using a local AM radio station or a specially designated frequency to broadcast travel information and instructions from the Public Safety Incident Command Post to arriving or departing patrons on the day of the event can help to lower their frustration. Broadcasting is also a means for event command and control staff to provide patrons with useful guidance and safety messages prior to their arrival. Much useful information, such as traffic routing and the AM radio station channel that will carry event traffic information, can be included in advance ticket-sales packets so spectators are informed before they even leave their homes.

Traffic Monitoring

Traffic monitoring should be carried out by periodic radio contact with ground forces in the field of the event "footprint" and by surveillance from aerial observation platforms. Fixed-wing aircraft can stay airborne for extended periods of time to obtain the full view of traffic flow. Helicopters can be used to view both the full area and specific problem areas that may warrant closer attention than can be provided by fixed-wing aircraft. Stationary, closed circuit TV cameras in areas prone to congestion can also be considered for use.

Public Transportation

If public transportation is to be used by patrons for access to the event, a separate ticketing and admitting area can be established to permit smooth drop-off and pick-up. If available, public transportation should be encouraged by event organizers because it tends to lessen the negative impact on local community street traffic. It also decreases the number of parking attendants required at the event site. Another facet of public transportation for consideration is event-only transportation. At many large-scale events that require off-venue parking, promoters lease school or private busses to provide transportation from specific pick-up sites within the community and from remote event-specific parking areas. If public transportation is offered, planners must coordinate with law enforcement and public works for assistance. Public works and law enforcement may choose to close lanes or streets for use only by the public transportation.

Towing and Disabled Vehicles

Promoters should be required to hire towing companies to facilitate the removal of disabled or illegally parked vehicles. At minimum, one tow truck per parking lot should be available and readily observable as private vehicles arrive. The mere presence and active use of tow trucks can act as a deterrent for those motorists who may consider parking illegally. As a general rule, one tow truck for every 2500 anticipated vehicles can be considered adequate for planning purposes. The size, type, and location of the event may change the needs.

Tow companies should establish a standard procedure for impounding and owner retrieval and should set maximum fees per impounded/towed vehicle in advance of the event. Also, a mechanism (database) for tracking where vehicles from certain areas have been towed and a mechanism for informing motorists of how to find their cars should be in place (for example, establish an 800 phone number). This information should be shared with the appropriate authority and the command post, should owners of towed vehicles arrive there to ask about their vehicles.

A consideration is for the promoter to be held accountable for any costs associated with towing that are not covered by towing fees. Public safety agencies should handle regulation and oversight of any towing arrangements made during the planning process.

Parking

With the crowd and the traffic risks also come the inevitable parking problems. A basic formula for estimating parking requirements is to anticipate one vehicle for every three persons in attendance. Areas of specific concern are:

- Public parking arrangements - Have you made arrangements for overflow parking, signposting, and segregation of pedestrian and vehicular traffic? If spectator-parking areas overflow, will congestion on surrounding roads result? Are shuttle buses desirable, feasible, or necessary?
- Parking control - Should anticipated spectator parking areas be filled, are there nearby areas for overflow parking? Are shuttle buses desirable, feasible, or necessary?

- Towing - Are towing policies established to determine where stalled or disabled vehicles will be towed, or how the owners can find their vehicles, and who bears the cost of towing and storage?

Auxiliary Parking Lots / Shuttles

If the event venue does not have established parking lots available, then temporary, auxiliary lots need to be established. Considerations for these lots include:

Lighting for hours of darkness,
Compliance with the ADA,
Publicizing the location of the parking lots and the shuttles,
Toilet facilities, and
Public transportation (shuttle busses) to and from the event site.

Dedicating specific busses to certain lots aids attendees going to and from the event. These lots should be clearly distinguished from one another and adequately marked. (Color-coding is one effective method of distinguishing busses. For example, Red Line busses, marked with a red dot in the window, only go to and from the red lot.) The location of these lots needs to be determined well in advance so that traffic management can evaluate them in relation to the overall incident traffic management plan. If these lots need to be rented or leased, the promoter should be held accountable by the permitting authority for any costs associated with their establishment.

Parking attendants in charge of the auxiliary lots are required to direct event spectators to park their cars in the configuration recommended by the traffic planner. If event spectators park their own cars, they may park in such a way that the capacity of the parking lot becomes greatly diminished, and control of traffic in and out of the lot can be lost. Parking attendants can be trained volunteers, paid promoter staff, or public safety personnel. A consideration is for the promoter to be held accountable for any costs associated with providing parking attendants.

PUBLIC HEALTH

Public health interventions are designed to prevent or minimize injury or ill health. Mass gatherings present particular challenges for prevention of or at least minimizing harm to participants, spectators, and event staff, especially when the event is held at a temporary venue. Familiarity of the financial stakeholders of the event with each other's roles and responsibilities, and knowledge of the potential and actual public health issues, present a common challenge.

This section provides guidance on the primary public health issues likely to arise during the planning phase of a mass gathering event. If state or local legislation is in place, that legislation takes precedence over advice contained in this manual.

Pre-event Public Health Survey

Event organizers should conduct a pre-event public health survey for any venue intended for a mass spectator event. A pre-event survey form is included in the appendix.

Organizers should consult appropriate health authorities to ascertain the availability of:

- Running water (particularly for hand washing by food service and medical personnel);
- Sufficient public toilets (with provision for pump out of portables and servicing as necessary during the event);
- Adequate refrigeration for perishable food stuffs;
- Recognized, approved suppliers of bulk food items delivered to the site food providers;
- Sufficient number of covered containers for the storage of food and solid waste, including removal during the event; and
- Appropriate storage and removal of liquid waste.

Public health inspectors should be available on site during the event to monitor public health compliance.

Public health authorities on site should have legislated authority to enforce "cease operation" orders on onsite food providers who are in contravention of standards or are otherwise operating contrary to the public interest.

Public Health Contingency Arrangements

The arrangements outlined in this chapter are designed to prevent an adverse event or minimize the risk that an adverse event will occur. However, unforeseen circumstances that may create a public health risk always exist. Some basic thought must be given to making contingency arrangements and documenting these arrangements in the public health emergency management plan. The plan should include the following details, as a minimum:

- Contact details, including after-hour information, for principal event personnel (for example, event organizers, environmental health officers, trades persons, and emergency service personnel, including health services personnel);
- Contact details for additional staff;
- Details for 24-hour contact of the food proprietors;
- Arrangements for alternative suppliers of equipment and utilities in the event of a failure or loss of water or power;
- Arrangements to replace food handlers who become ill;
- Arrangements in case of product recall;
- Epidemiological tracking;
- Procedures for handling complaints; and
- A debriefing procedure.

Monitoring Health Risks

First aid posts and security personnel can provide information to help assess health and safety risks. First aid posts can provide data by collecting gastrointestinal illness surveillance information (see the appendix for a questionnaire form) or maintaining records of injuries, incidents involving watercourses, and alcohol and drug issues. Security agencies can provide information on safety hazards and alcohol and drug issues.

Food Safety

Food safety is a vital element of public health planning for public events. Unless personnel apply proper sanitary practices to food storage, preparation, and distribution at mass gatherings, food may become contaminated and present a danger to public health. Special "one-of-a-kind" outdoor events in warm weather pose additional risks since they tend to have less than ideal facilities for food handling, transport, and storage.

To ensure that adequate food safety standards are met and maintained, an environmental health officer should initially assess food service proposals, including the authorization of vendors, as part of the pre-event planning outlined in Chapter 1. The health officer should base any assessment on current local and state food hygiene legislation and food safety codes. The officer should follow this assessment with a pre-event audit as well as periodic monitoring of food safety throughout the event.

This assessment should form part of a comprehensive food safety plan for the event, including:

- Licensing/permit procedures and authorization of vendors,
- Quantities and types of food,
- Lines of supply,
- Premises where food is stored,
- Preparation techniques,
- Disposal of foods,
- Means of distribution, and
- Food safety documentation, including the Hazard Analysis Critical Control Point (HACCP) approach and surveillance.

Food vendors must meet appropriate licensing and registration requirements of the responsible health authority, including an "off-premises" food-catering license as appropriate. During the event, onsite environmental health officers must have the authority to close down any vendor who is contravening food hygiene legislation and public health requirements. In some cases, this action may necessitate passing particular local laws or ordinances.

A sample "Checklist for Food Vendors" form appears in the appendix.

Food Premises

Set up and construction of the food premises must be in accordance with state regulation and codes of practice. The premises or areas to be used for food storage, preparation, and service must be easily cleaned and neither promotes the harboring of rodents and insects nor the build up of dirt and food particles.

Equipment

Equipment used in food preparation, distribution, and storage must be in a safe working order and easily cleaned.

Safety

The safety of both staff and the public is always an important consideration, and you must meet occupational health and safety standards. Some of the hazards to avoid include loose power leads, trip hazards, inadequate refuse disposal, inappropriate positioning of equipment (especially hot equipment), poor ventilation and extreme temperatures in the work environment, badly stacked supplies, and unguarded equipment.

Waste Disposal

A regular disposal system should be put in place. Decayable refuse, in particular, can cause problems arising from odor, insects or rodents, or other animals. Adequate disposal facilities must be easily accessible to food handlers as well as removal contractors.

Organize a separate refuse collection for food premises and continually monitor it to ensure that the frequency of collection is appropriate.

Where possible, encourage the separation of refuse into dry, wet, and hazardous disposal units. For more information on refuse disposal, refer to the discussion under Waste Management below.

Water Supply

Provision of a supply of potable water for sinks is essential. Those operators using water stored in their own tanks must have access to facilities to refill diminished supplies. Ensure that this access is organized before the event. If possible, at outdoor concerts in extreme heat conditions, all potable water supply lines should be buried to avoid breakage and contamination by concert attendees. Having a NO GLASS policy is wise to prevent hazards caused by broken glass. (For more specific details on water supply, refer to the section on Water below.)